MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

MAX2053 – 3D SIMULATION
(All sections / Groups)

04 MARCH 2016
9.00 a.m - 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 12 pages of simulated questions. Read them carefully.

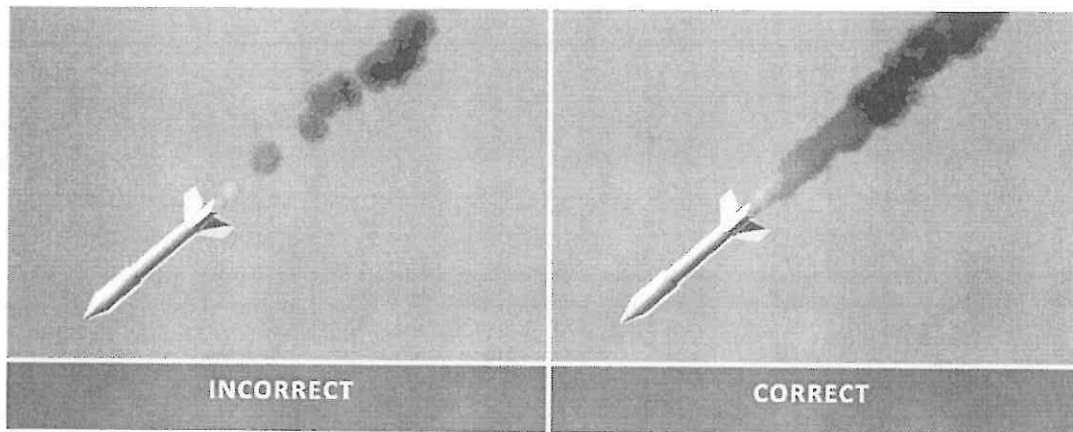2. This exam paper consists of TWO parts:
   Part One: Multiple Choices   Answer **ALL** questions
   Part Two: Essay Questions   Answer **TWO** out of THREE

3. Write all your answers in the Answer Booklet provided. May the force be with you.

PART ONE: MULTIPLE CHOICE QUESTIONS
Answer ALL Questions in the Multiple Choice Answer Sheet.

1. What does '*n*' stands for in *nDynamics*?

    A. Nuclear
    B. Next-Gen
    C. Nominal
    D. Nucleus

2. Barney wants to create a simulation of a ball bursting through a brick wall. Which rigid body types does he need to assign in his scene?

    A. Ball = Active, Bricks = Passive, Ground = Passive
    B. Ball = Passive, Bricks = Active, Ground = Passive
    C. Ball = Passive, Bricks = Active, Ground = Active
    D. Ball = Active, Bricks = Active, Ground = Passive

3. Which dynamics simulation systems would an artist use to create a jelly like effect on a 3D model?

    A. Rigid Body Simulation with Springs
    B. Soft Body Simulation with Goals
    C. Soft Body Simulation with Goals and Springs
    D. Soft Body Simulation with Goals and Constraints

4. Which attribute in the Gravity field controls the strength of the force?

    A. Attenuation
    B. Magnitude
    C. Fall Off
    D. Speed

5. Which is **NOT** the correct method to create *nParticles* in MAYA?

    A. Use the Paint Effects Tool
    B. Create an Emitter
    C. Emit from Object
    D. Use Fill Object Tool

Continued ....

Image 01

6. *Image 01* above does not produce the correct smoke trail effects required. How can it be fix?

    A. Increase the emission rate attribute
    B. Increase the lifespan attribute
    C. Decrease the spread attribute
    D. Decrease the speed random attribute

7. Dollah has created a fountain effect using default particles in MAYA. However, his client requests that the fountain emits **ONLY** blue and red particles. How can he achieve this?

    A. Create TWO RGP Per Particle array and assign Blue and Red coloured shaders on each of them
    B. Create a Creation expression and assign a random Blue or Red syntax on the RGB PP attribute
    C. Create a Runtime expression and assign a Red and Blue ramp shader with linear interpolation
    D. Create a RGB Per Object attribute and assign TWO RGB(red) and RGB(blue) creation expressions

8. Which particle render types listed below are **NOT** hardware based particles?

    A. Cloud
    B. Sprites
    C. Streaks
    D. Numeric

Continued ....

9. Which options below can be used to alter the duration of a particle's existence?

     I. Distance Attribute > Spread   II. Emission Attribute > Max Count
    III. Lifespan Mode > Random Range   IV. Per Particle Array > Lifespan PP

    A. I, II and III
    B. I, III and IV
    C. II, III and IV
    D. All of the above

10. What colour would this particle expression below produce?

$$particleShape1.rgbPP = <<0,0.5,1>>;$$

    A. Black
    B. Light Blue
    C. Light Green
    D. Dark Red

11. Sometimes, a Rigid Body collision between two objects would penetrate and cause the simulation to malfunction. How can we improve the simulation and minimise object penetration during collisions?

    A. Increase the Scale Velocity and the Tessellation Factor of the collision object
    B. Decrease the Scale Velocity and the Tessellation Factor of the collision object
    C. Increase the Step Size and Collision Tolerance of the Rigid Solver
    D. Decrease the Step Size and Collision Tolerance of the Rigid Solver

12. Which types of NURBS curves below are acceptable for Dynamic Curve simulations?

    I. CV NURBS curve   II. EP NURBS curve
   III. Open NURBS curve   IV. Closed NURBS curve

    A. I and II only
    B. II and IV only
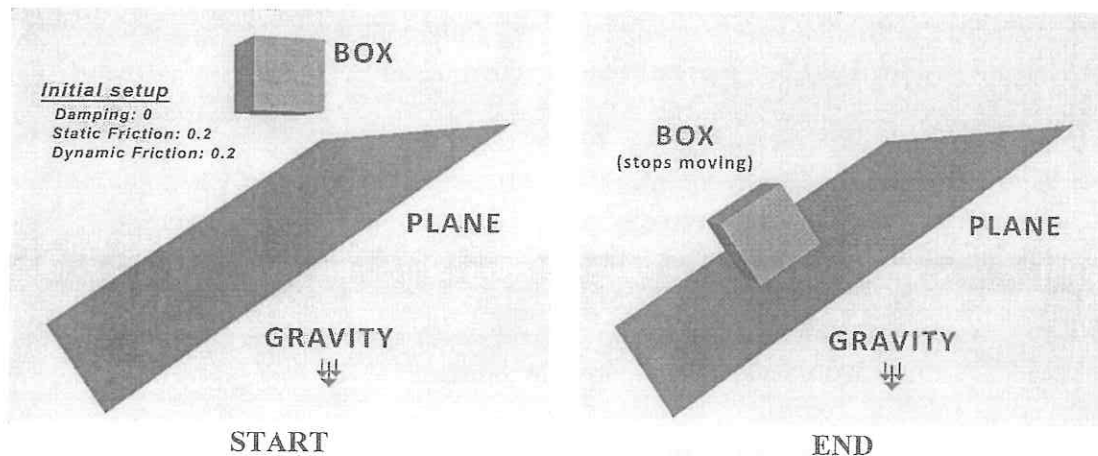   C. All of the above
    D. None of the above

Image 02

13. *Image 02* above shows a simple Rigid Body setup of a Passive Plane, a Gravity field and an Active Box with its initial setup at **START**. A normal simulation would cause the Box to slide off the plane and fall. How would you adjust the attributes to achieve the result shown at **END** where the Box 'sticks' onto the plane?

   A. Decrease Damping, Increase Static Friction and Decrease Dynamic Friction
   B. Increase Static Friction and Increase Dynamic Friction
   C. Increase Damping, Decrease Static Friction and Increase Dynamic Friction
   D. Increase Damping, Increase Static Friction and Increase Dynamic Friction

14. What is the best workflow when using *nCloth* simulation for your 3D character project?

   I.   Constraint the *nCloth* clothing to itself and its character
   II.   Make the connections between your *nCloth* and collision objects
   III. Create character's clothing *nCloth*
   IV.   Adjust *nCloth* properties to simulate

   A. III > II > IV > I
   B. III > IV > II > I
   C. III > I > IV > II
   D. III > II > I > IV

Continued ....

15. Enlarging a fluid container would cause the fluid content to look less dense. How would you increase the density of the fluid container?

   A. Increase the Fluid Resolution
   B. Increase the Voxel Resolution
   C. Increase the Threshold Resolution
   D. Increase the Viscosity Resolution

16. Elsa wants to attach an existing snow effects with a new turbulence field. Which MAYA editor would she use to complete the task?

   A. Dynamics Component Editor
   B. Dynamics Relationship Editor
   C. Fields Connection Editor
   D. Attributes Connection Editor

17. What is the main purpose of Bullet dynamic engine in MAYA?

   A. To easily simulate realistic bullet effects collisions
   B. To easily simulate high-polygon count objects
   C. To easily simulate large-scale kinematics calculation
   D. To easily simulate extremely dense particle collisions

18. Which fields listed below are **NOT** used in any MAYA dynamic simulations?

   A. Impulse
   B. Vortex
   C. Newton
   D. Volume Axis

19. Which statement regarding Particle Cloud Shader below is **TRUE**?

   A. The Particle Cloud Shader can be used together with Tube particle type
   B. The Particle Cloud Shader is the only volumetric shader in MAYA
   C. The Particle Cloud Shader can only be rendered using software renderer
   D. The Particle Cloud Shader cannot cast self-shadows onto itself

20. The 'Conserve' attribute is a very significant element in any dynamic simulation. Which of the following are **FALSE** regarding the Conserve attribute?

 I. Conserve allows MAYA to retain all history of simulation fields that affected the object
 II. Conserve allows an object to regain its speed without external fields affecting the object
 III. Conserve does not affect simulated objects before a collision event
 IV. Conserve does not allow objects to lose its internal forces when it is affected by fields

 A. I, II and III
 B. I, II and IV
 C. II, III and IV
 D. All of the above

21. *nCloth* can sometime cause the cloth to bunch or clump together during simulation. This is due to the crossovers of points that happened during simulation. What can you do to minimise the crossovers and ensure a cleaner, better *nCloth* simulation results?

 I. Increase the Max Self Collision Iteration value
 II. Turn on the Sort Stretch Links
 III. Minimise the Push Out Value
 IV. Turn on the Self Trapped Check option
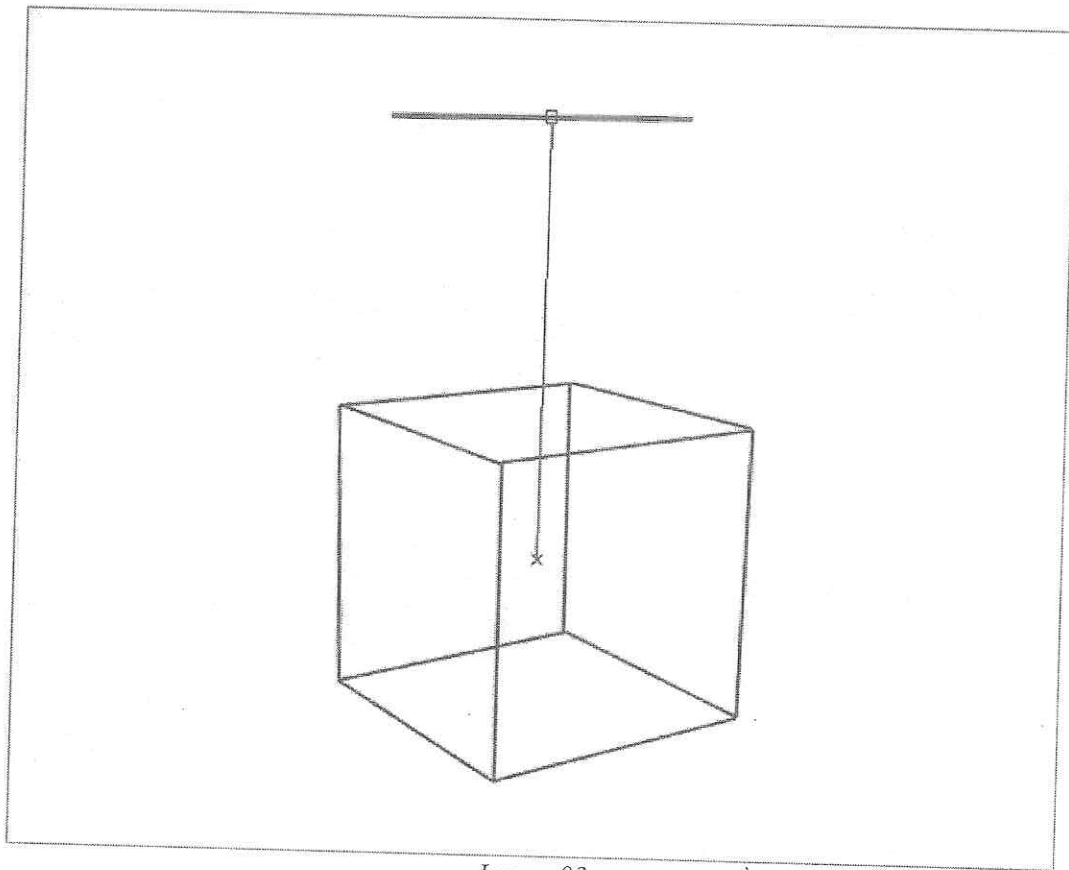
 A. I and III
 B. I and IV
 C. II and III
 D. III and IV

22. The amount of particles emitted from a particle emitter in MAYA depends on its Rate value. How does MAYA measure the Rate value?

 A. Amount of particles emitted per cycle
 B. Amount of particles emitted per frame
 C. Amount of particles emitted per second
 D. Amount of particles emitted per lifespan

Continued ....

23. Using MAYA particles, Buntal has created an effect scene of mud falling on a rooftop. His mud bounced too much off the roof and caused the scene to fail. What can he do to ensure that the mud slides instead of bouncing off the roof?

    A. Decrease the collision resilient value
    B. Increase the collision tessellation factor
    C. Increase the collision friction value
    D. Change the collision offset value to a negative number

24. Charles Xavier is simulating a dense *nCloth* model but is having difficulties getting the cloth to stop vibrating. What can he do to minimise the vibration?

    I. Increase the number of collision iterations
    II. Increase the number of substeps
    III. Increase the damping of the *nCloth*
    IV. Increase the bend resistance of the *nCloth*

    A. I, II, and III
    B. I, II, and IV
    C. I, III and IV
    D. II, III and IV

25. Eric Lensherr is trying to simulate a lot of coins to fall onto the floor using Bullet in MAYA. However, selecting each coins to tweak his simulation is hindering his speed and productivity. What is the **BEST** solution for him to improve his Bullet workflow?

    A. Create a set driven key on a single coin to automate selection for all coins
    B. Parent all the coins into one group and apply Bullet simulation onto the group
    C. Create multiple selection handles to group the coins together
    D. Create a Rigid Sets to control all simulation attributes

26. Which attribute below would you need to adjust in order to create a loose rope effect using *nHair*?

    A. Increase the Stretch Resistance and Bend Resistance. Decrease the Substep
    B. Increase the Substep and Stretch Resistance. Decrease the Bend Resistance
    C. Decrease the Damp Value. Increase the Bend Follow and Stretch Resistance
    D. Decrease the Damp Value and Bend Follow. Increase Stretch Resistance

Image 03

27. *Image 03* displays a certain type of constraint used in MAYA Rigid Body simulation. Which constraint is this?

    A. Pin Constraint
    B. Stick Constraint
    C. Wire Constraint
    D. Hinge Constraint

28. Marcus Aurelius wants to create an epic scene where a group of Roman soldiers are shooting CGI arrows onto the opposing army. Marcus uses MAYA Particle Instancer to execute the effects, but the arrows are flying backwards. Which attribute does he need to correct in order to achieve his epic scene?

    A. Rotation > Change to Acceleration
    B. Aim Direction > Change to World Position
    C. Aim Direction > Change to Velocity
    D. Aim Axis > Change to World Velocity

Continued ....

29. The Turbulence field is commonly used to simulate random movements in dynamic simulation. Which of the following is **FALSE** regarding the turbulence field in MAYA?

    I.   The turbulence field does not affect any Rigid Body simulations
    II.   The force of the turbulence is always stronger near the center of the field
    III.   The volume control attribute controls the turbulence's shape of influence
    IV.   The turbulence field is similar to the noise field in MAYA

    A. I, II and III
    B. I, II and IV
    C. II, III and IV
    D. I, III and IV

30. Bulma is tasked to create a rain effect scene with water splashes emitting on the surface floor when the rain drop hits the ground. Which tool is the **BEST** for her to create this effect?

    A. Make Collide with Particle Instancer
    B. Make Collide with Particle Collision Event Editor
    C. Position multiple polygon meshes on the ground and emit from surface
    D. Draw particles with the Particle Tool and use Uniform field to move

PART TWO: SUBJECTIVE QUESTIONS
Answer TWO of the following Three Questions. Give DIRECT answers.

Question 1

I.   Please explain what is Dynamic Animation and provide some simple examples?
      Explain briefly how it is different than Traditional Animation?

(4 marks)

II.   Explain how MAYA simulates a dynamic scene during playback and how it
      would affect the performance of a 3D simulation workflow?

(4 marks)

III. Explain what is 'Caching Simulation' and its benefits in a 3D simulation process?

(8 marks)

IV.   What are the differences between a cached simulation and a baked simulation?

(4 marks)

Question 2

I.   List down **THREE** types of Curves generated for an *nHair* simulation. Explain
      briefly what their roles are in an *nHair* simulation process?

(6 marks)

II.   Explain briefly how these *nHair* constraints work in a *nHair* simulation system:

      TRANSFORM CONSTRAINT:
      COMPONENT TO COMPONENT CONSTRAINT:
      POINT TO SURFACE CONSTRAINT:
      SLIDE ON SURFACE CONSTRAINT:
      FORCE FIELD CONSTRAINT:

(10 marks)

III. Give **FOUR** examples of real world effects that can be animated using dynamic
      curves from *nHair* simulation system.

(4 marks)

Question 3

I.   What are the differences between an Active Rigid Body and a Passive Rigid Body?

(4 marks)

II.   Please briefly explain how these attributes affect a Rigid Body simulation?

MASS:
BOUNCINESS:
DAMPING:
CENTER OF MASS:
STATIC FRICTION:
DYNAMIC FRICTION:

(6 marks)

III.   List **FIVE** Rigid Body constraints and briefly explain their functions.

(10 marks)

*Please check, re-check and triple-check your answers until the exam ends

End of Paper.